Biodiversity Data Journal 1: e1000
doi: 10.3897/BDJ.1.e1000

open access

Taxonomic paper

Three new species of the millipede genus *Hyleoglomeris* Verhoeff, 1910 from the Aegean region of Greece (Diplopoda, Glomerida, Glomeridae)

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Academic editor: Pavel Stoev

Received: 01 Oct 2013 | Accepted: 23 Oct 2013 | Published: 06 Nov 2013

Citation: Golovatch S (2013) Three new species of the millipede genus *Hyleoglomeris* Verhoeff, 1910 from the Aegean region of Greece (Diplopoda, Glomerida, Glomeridae). Biodiversity Data Journal 1: e1000. doi: 10.3897/BDJ.1.e1000

ZooBank: urn:lsid:zoobank.org:pub:5E729B12-BCE6-44BE-B91D-A7CFA640FA49

Abstract

Three new cavernicolous species of *Hyleoglomeris* are described from Greece: *H. subreducta* sp.n., from Chios Island, *H. translucida* sp.n., from Rhodes Island, and *H. insularis* sp.n., from Kalymnos Island, all in the Aegean Sea.

Keywords

Millipede, *Hyleoglomeris*, new species, cave, Chios, Rhodes, Kalymnos, Greece

Introduction

In Eurasia, the largely Holarctic, warm temperate to tropical millipede order Glomerida is long known to show two main centres of generic and species diversification, one in the Mediterranean, the other in the Oriental realm (Golovatch et al. 2010). *Hyleoglomeris*

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Verhoeff, 1910 is the only genus shared by the two, being the largest and certainly the most widespread in the entire order. It dominates the Oriental fauna of Glomerida, containing nearly 100 nominate species ranging from Serbia, Balkans in the West to Japan in the East, and the Sunda Archipelago (Sulawesi) in the Southeast (Golovatch et al. 2006, Golovatch et al. 2012, Golovatch et al. 2013, Golovatch and Geoffroy 2012, Makarov et al. 2013). In the Balkans and northwestern Anatolia, the range slightly overlaps with that of the Euro-Mediterranean and also speciose genus *Glomeris* Latreille, 1803. In this overlap area, all known *Glomeris* species seem to be epigean, whereas the *Hyleoglomeris* spp. appear to be subterranean. Both these genera are deemed quite closely related, at least belonging to the same subfamily Glomerinae Leach, 1815 (see Hoffman 1980), even though Mauriès (2006) places them in different tribes. The main distinction between *Glomeris* and *Hyleoglomeris* lies in the considerably less strongly differentiated caudofemoral process on male leg-pair 19 (= telopods) in the former genus (Mauriès 1971). In *Hyleoglomeris*, this outgrowth has become enlarged, set at nearly a right angle to the femur and directed more ventrally than mesally, with the tip supporting a membranous sac. *Glomeris* appears to be simpler, likely more basal, in that its species are normally larger in size, with less numerous striae on the second tergite (often referred to as a thoracic shield, in any event to be treated only as a highly conventional term), in possessing a less strongly reduced male leg-pair 17, and usually in having no caudal tubercle at the base of the tibial outgrowth of the telopod (Golovatch et al. 2012).

Greece, both mainland and islands, currently supports seven genera and 11 species of Glomerida (Thaler 2000, Thaler 2003), of which two species belong to *Hyleoglomeris*: *H. beroni* Mauriès, 1984, from a cave on Naxos Island, and *H. epirotica* (Mauriès, 1966), from a cave near Ioannina, Epirus (Mauriès 1966, Mauriès 1984). The present note puts on record another three new species of this very large genus, each found in a cave on three other Greek islands in the Aegean Sea. A rich fauna of *Hyleoglomeris*, especially of cavernicoles, is evidently present at or near the western periphery of its distribution area.

Materials and methods

The material underlying this contribution was received for study through the courtesy of Pavel Stoev, of the National Museum of Natural History, Sofia, Bulgaria (NMNHS). All samples had been taken by Petar Beron (NMNHS), an outstanding collector and researcher. Most of the types have been returned to the NMNHS collection, with only a few paratypes retained for the collection of the Zoological Museum, State University of Moscow, Russia (ZMUM), as indicated below.

Taxon treatments

Hyleoglomeris subreducta Golovatch, 2013, sp. n.

- ZooBank urn:lsid:zoobank.org:act:66006F7F-BDDD-417E-92DF-34B896F75A5B

Materials

Holotype:

a. island: Chios; country: Greece; verbatimLocality: village Haghios Galos (Agiongalas, Haghia Gala), 65 km from town of Chios, Cave Hagiogalousaina; eventDate: 1987-05-12; sex: 1 male; recordedBy: P. Beron; institutionCode: NMNHS

Paratypes:

a. island: Chios; country: Greece; verbatimLocality: village Haghios Galos (Agiongalas, Haghia Gala), 65 km from town of Chios, Cave Hagiogalousaina; eventDate: 1987-05-12; sex: 1 male, 3 female, 3 juveniles; recordedBy: P. Beron; institutionCode: NMNHS

b. island: Chios; country: Greece; verbatimLocality: village Haghios Galos (Agiongalas, Haghia Gala), 65 km from town of Chios, Cave Hagiogalousaina; eventDate: 1987-05-12; sex: 1 male, 1 female; recordedBy: P. Beron; institutionCode: ZMUM

Description

Length of holotype ca 5.5 mm, width (maximum on tergum 2) ca 2.5 mm; length of paratypes ca 5.0-6.0 mm, width on tergum 2 ca 2.1-3.0 mm, or males and females, respectively. Body from nearly entirely pallid (especially so in smaller specimens) to coloration remnants persisting on head and terga (Fig. 1a, b, c). Head usually with a considerably infuscate, large, brownish to blackish patch around Tömösváry's organ and ocelli each side (Fig. 1b, c), antennae pallid to very faintly brownish yellow. Trunk from entirely pallid to very faintly brown or grey-brown, in the latter case with a peculiar pattern (Fig. 1a, b, c). Collum very slightly marbled brownish on sides and with a rather wide, light brownish, subcaudal band in front of a narrowly flavous caudal margin (Fig. 1a, b). Tergum 2 (= thoracic shield) with a similar pattern, but subcaudal band wider, slightly broadened and remaining only above schism laterally while central part subtriangular and extending nearly up to front margin (Fig. 1a, b, c). Following terga with a similar pattern as well, each with a paramedian pair of large, transversely oval, flavous, sublateral, anterior spots above broadly flavous lateral margin. Last tergum (= pygidium) nearly entirely and uniformly light brown or grey-brown, with a broad flavous band at caudal margin (Fig. 1a, b, c). Ocelli 5+1 or 6+1, convex, completely translucid, but mostly clearly discernible due to an infuscated nearby background (Fig. 1b, c). Tömösváry's organ pallid, transverse-oval, ca 1.4 times wider than long. Antennomere 6 rather long, ca 2.0–2.1 times as long as high. Collum with two transverse striae. Tergum 2 with a narrow hyposchism extending behind to reach the caudal tergal margin; 7-8 superficial transverse striae, only one starting below schism, one level with, all others above schism while three (never last one from below) crossing the dorsum. Male anal shield regularly rounded at caudal margin. Male leg 17 (Fig. 2a) with a rather

high, regularly rounded, outer coxal lobe; telopodite 4-segmented, tarsus with three strong apical spines. Male leg 18 (Fig. 2b) with a regularly rounded syncoxital notch; telopodite 4-segmented, tarsus with one apical spine. Male legs 19, or telopods (Fig. 2c), with a high, regularly rounded, central syncoxital lobe flanked by two setose horns, each latter only slightly higher than central lobe and crowned by a minute, elongate, acuminate, membranous lobule devoid of adjacent structures. Prefemur and, to a lesser extent and only parabasally, femur micropapillate laterally. Caudomedial femoral process prominent, directed distomedially at ca 100° to femur, mostly strongly chitinized, only apically with a small membranous sac, but devoid of any chitinized lobe. Caudomedial process of tibia evident, sac-shaped, membranous, with an evident, rounded tubercle on caudal face at base. Tarsus rather strongly curved, subacuminate apically.

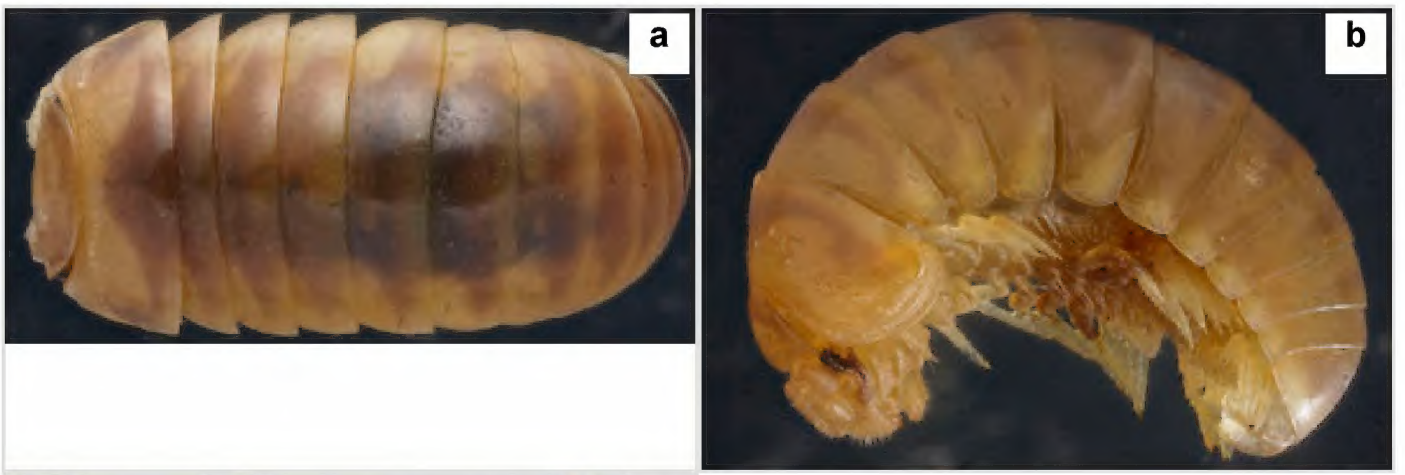

Figure 1.

Habitus of *Hyleoglomeris subreducta* sp. n., a pigmented male paratype. Photos by K. Makarov, not taken to scale.

a: Dorsal view
b: Lateral view
c: Ventrolateral view

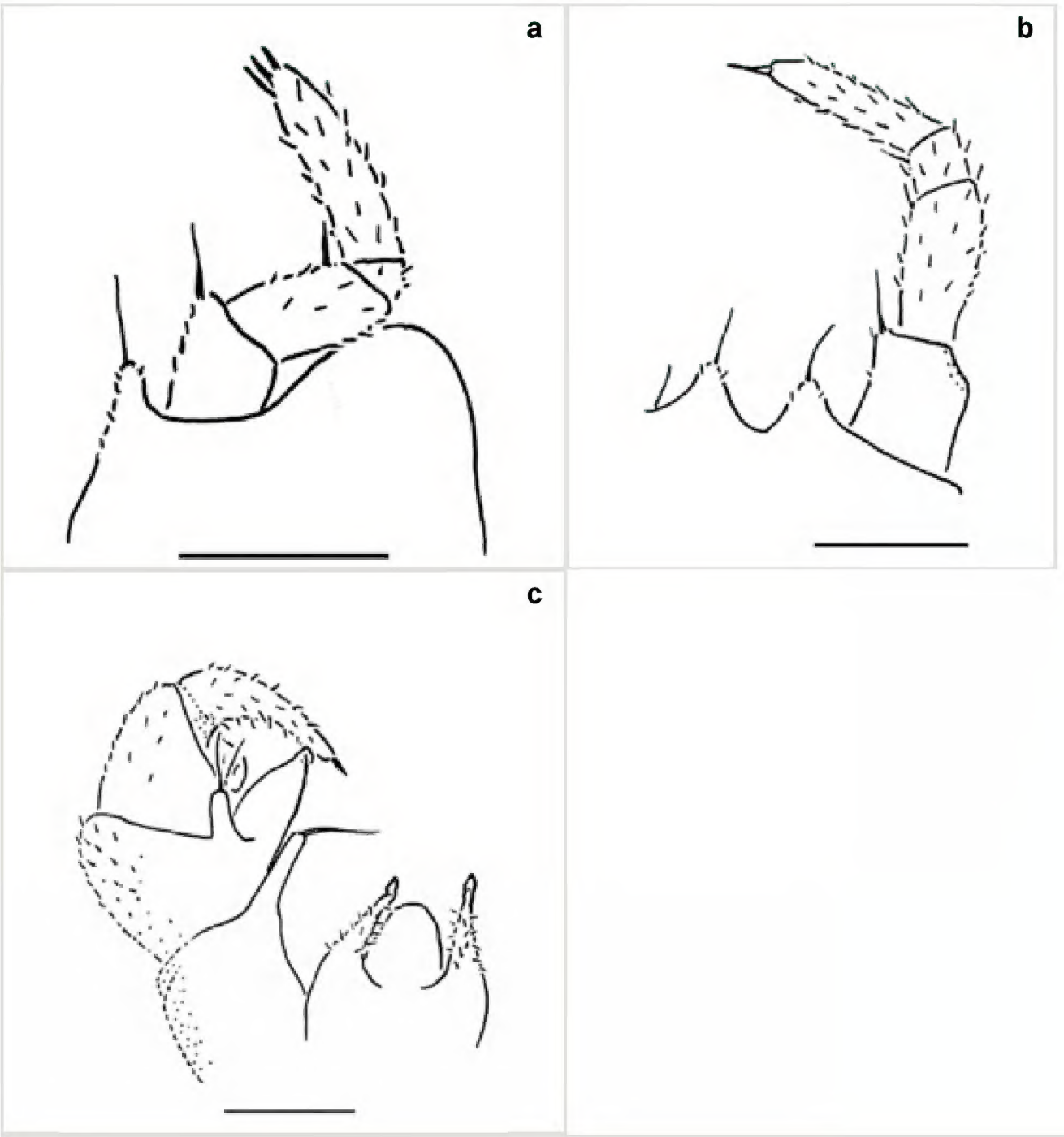

Figure 2.

Hyleoglomeris subreducta sp. n., a pigmented male paratype.

a: Leg 17, front view. Scale bar: 0.2 mm.
b: Leg 18, front view. Scale bar: 0.2 mm.
c: Leg 19, front view. Scale bar: 0.2 mm.

Diagnosis

Differs from congeners in a partly to completely unpigmented body, coupled with sometimes still persisting remnants of a peculiar colour pattern, a rather long antennomere 6 which is ca 2.0–2.1 times as long as high, as well as by a narrow hyposchism which only reaches the caudal margin of tergum 2, and 7-8 transverse striae of which three cross the dorsum on tergum 2. Differs clearly from all known Greek congeners, including two new ones described below, also by a 4-segmented male telopodite 17 (Fig. 2a).

Etymology

To emphasize the nearly fully to fully reduced body coloration similar to the condition observed in the southern Chinese cavernicole, *H. reducta* Golovatch, Geoffroy & Mauriès, 2006. An adjective.

Taxon discussion

Due to such a troglomorphic feature as the completely or nearly completely unpigmented body, this species may well prove to be a troglobite. This cave on Chios is known to harbour at least one more endemic troglobite, the false-scorpion *Chthonius chius* Schawaller, 1990 (Pseudoscorpiones, Chthoniidae) (Harvey 2008).

Hyleoglomeris translucida Golovatch, 2013, sp. n.

- ZooBank urn:lsid:zoobank.org:act:85DE9877-212A-4767-87B8-90D145E27B25

Materials

Holotype:

a. island: Rhodes; country: Greece; verbatimLocality: village Archangelos, Cave Coumellos; eventDate: 1987-05-02; sex: 1 male; recordedBy: P. Beron; institutionCode: NMNHS

Paratypes:

a. island: Rhodes; country: Greece; verbatimLocality: village Archangelos, Cave Coumellos; eventDate: 1987-05-02; sex: 2 males, 6 females, 2 juveniles; recordedBy: P. Beron; institutionCode: NMNHS
b. island: Rhodes; country: Greece; verbatimLocality: village Archangelos, Cave Coumellos; eventDate: 1987-05-02; sex: 1 male, 1 female; recordedBy: P. Beron; institutionCode: ZMUM

Description

Length of holotype ca 4.1 mm, width (maximum on tergum 2) ca 1.8 mm; length of paratypes ca 4.0-4.3 mm, width on tergum 2 ca 1.8-2.0 mm, or 4.3-5.0 and 2.0-2.6 mm in males and females, respectively. Body entirely pallid (Fig. 3).

Figure 3.

Habitus of *Hyleoglomeris translucida* sp. n., female paratype, lateral view. Photo by K. Makarov, not taken to scale.

Ocelli ca 6+1, convex, completely translucid, poorly discernible (Fig. 3). Tömösváry's organ pallid, transverse-oval, ca 1.4-1.5 times wider than long. Antennomere 6 rather long, ca 2.1–2.2 times as long as high.

Collum with two transverse striae. Tergum 2 with a narrow hyposchism extending behind to reach the caudal tergal margin; 6-7 superficial transverse striae, two starting below schism, one level with, all others above schism, with only one (never last one from below) crossing the dorsum. Male anal shield regularly rounded at caudal margin.

Male leg 17 (Fig. 4a) with a rather low, regularly rounded, outer coxal lobe; telopodite 3-segmented, tarsus with two strong apical spines.

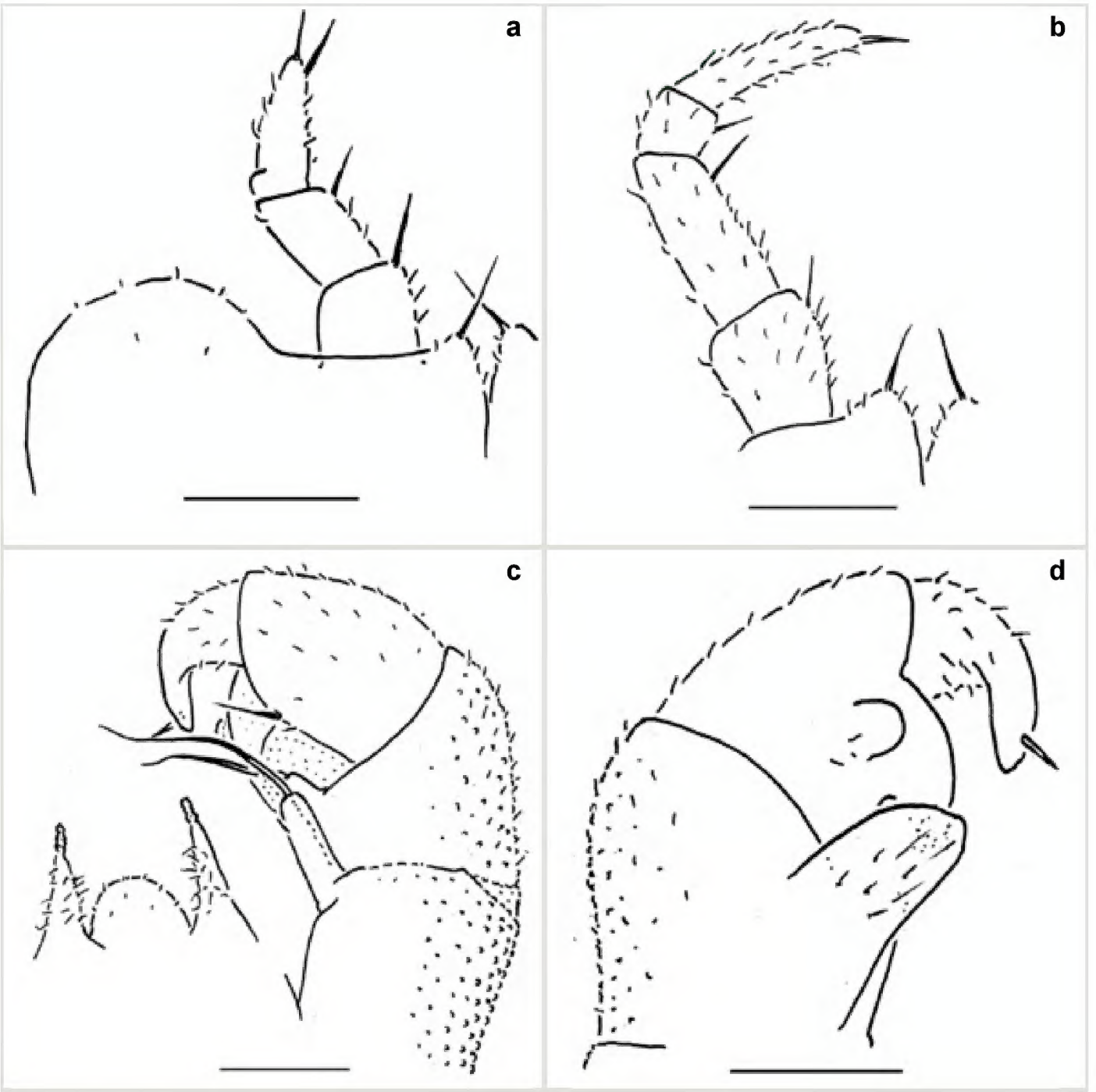

Figure 4.

Hyleoglomeris translucida sp. n., male paratype.

a: Leg 17, front view. Scale bar: 0.1 mm.
b: Leg 18, front view. Scale bar: 0.1 mm.
c: Leg 19, front view. Scale bar: 0.1 mm.
d: Leg 19, caudal view. Scale bar: 0.1 mm.

Male leg 18 (Fig. 4b) with a narrow syncoxital notch; telopodite 4-segmented, tarsus with one apical spine.

Telopods (Fig. 4c, d) with a medium-sized, regularly rounded, central syncoxital lobe flanked by two setose horns, each latter clearly higher than central lobe and crowned by a small, elongate membranous lobule devoid of adjacent structures. Prefemur and, to a lesser extent and only parabasally, femur micropapillate laterally. Caudomedial femoral process prominent, directed distomedially at ca 100° to femur, mostly strongly chitinized, only apically with a small membranous sac, on caudal face slightly setose. Caudomedial process of tibia evident, sac-shaped, membranous, at base with an

evident, parabasally poorly setose tubercle on caudal face. Tarsus rather strongly curved, subacuminate apically.

Diagnosis

Differs from congeners in a completely unpigmented body, coupled with a rather long antennomere 6 which is ca 2.1–2.2 times as long as high, as well as by a narrow hyposchism which only reaches the caudal margin of tergum 2, 6-7 transverse striae of which only 1-2 cross the dorsum on tergum 2, a 3-segmented male telopodite 17, and a caudally slightly setose distomesal process of the telopod femur.

Etymology

To emphasize the fully unpigmented, translucid body. An adjective.

Taxon discussion

Due to such a clearly troglomorphic feature as the completely unpigmented body, this species may prove to be a troglobite.

Hyleoglomeris insularis Golovatch, 2013, sp. n.

- ZooBank urn:lsid:zoobank.org:act:87F46896-93D4-49A2-A857-C06F44A8910A

Materials

Holotype:

a. island: Kálimnos; country: Greece; verbatimLocality: village Scalia, Cave Scalia; eventDate: 1987-05-04; sex: 1 male; recordedBy: P. Beron; institutionCode: NMNHS

Paratypes:

a. island: Kálimnos; country: Greece; verbatimLocality: village Scalia, Cave Scalia; eventDate: 1987-05-04; sex: 2 males, 2 females; recordedBy: P. Beron; institutionCode: NMNHS

b. island: Kálimnos; country: Greece; verbatimLocality: village Scalia, Cave Scalia; eventDate: 1987-05-04; sex: 1 male, 1 female; recordedBy: P. Beron; institutionCode: ZMUM

Description

Length of holotype ca 6.0 mm, width (maximum on tergum 2) ca 3.0 mm; length of paratypes ca 6.0-6.2 mm, width on tergum 2 ca 3.0-3.1 mm, or 6.2-7.5 and 3.2-3.4 mm in males and females, respectively. Body nearly entirely pallid (Fig. 5), only dorsal side of head retaining a faint to mediocre, rather uniform brownish coloration often growing a little darker on antennae and pale grey to nearly blackish around ocelli (Fig. 5b).

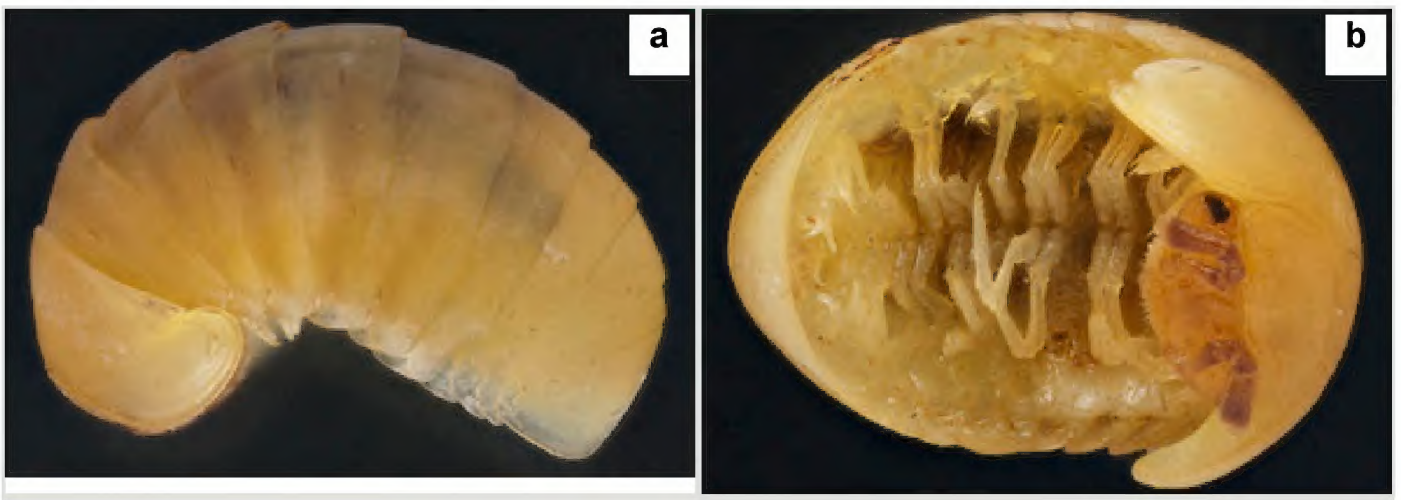

Figure 5.

Habitus of *Hyleoglomeris insularis* sp. n., male paratype. Photos by K. Makarov, not taken to scale.

a: Lateral view
b: Ventral view

Ocelli 6+1 or perhaps 7+1, convex, completely translucid, but mostly clearly discernible due to an infuscated nearby background (Fig. 5b). Tömösváry's organ pallid, transverse-oval, ca 1.4-1.5 times wider than long. Antennomere 6 long, ca 2.3–2.4 times as long as high.

Collum with two transverse striae. Tergum 2 with a rather broad hyposchism extending considerably behind caudal tergal margin (Fig. 5a); 4-5 superficial transverse striae, 1-2 starting below schism, remaining 2-3 above it, with three (never last one from below) crossing the dorsum. Male anal shield regularly rounded at caudal margin.

Male leg 17 (Fig. 6a) with a rather low, regularly rounded, outer coxal lobe; telopodite 3-segmented, tarsus with two strong apical spines.

Male leg 18 (Fig. 6b) with a narrow syncoxital notch; telopodite 4-segmented, tarsus with one apical spine.

Telopods (Fig. 6c) with a high, rounded, clearly emarginate, central syncoxital lobe flanked by two setose horns, each latter only slightly higher than central lobe and crowned by a minute, elongate, acute, membranous lobule devoid of adjacent structures. Only prefemur micropapillate laterally. Caudomedial femoral process prominent, directed distomedially at ca 100° to femur, mostly strongly chitinized, only apically with a small membranous sac, but devoid of any chitinized lobe. Caudomedial process of tibia evident, sac-shaped, membranous, with an evident, rounded tubercle on caudal face at base. Tarsus rather modestly curved, subacuminate apically.

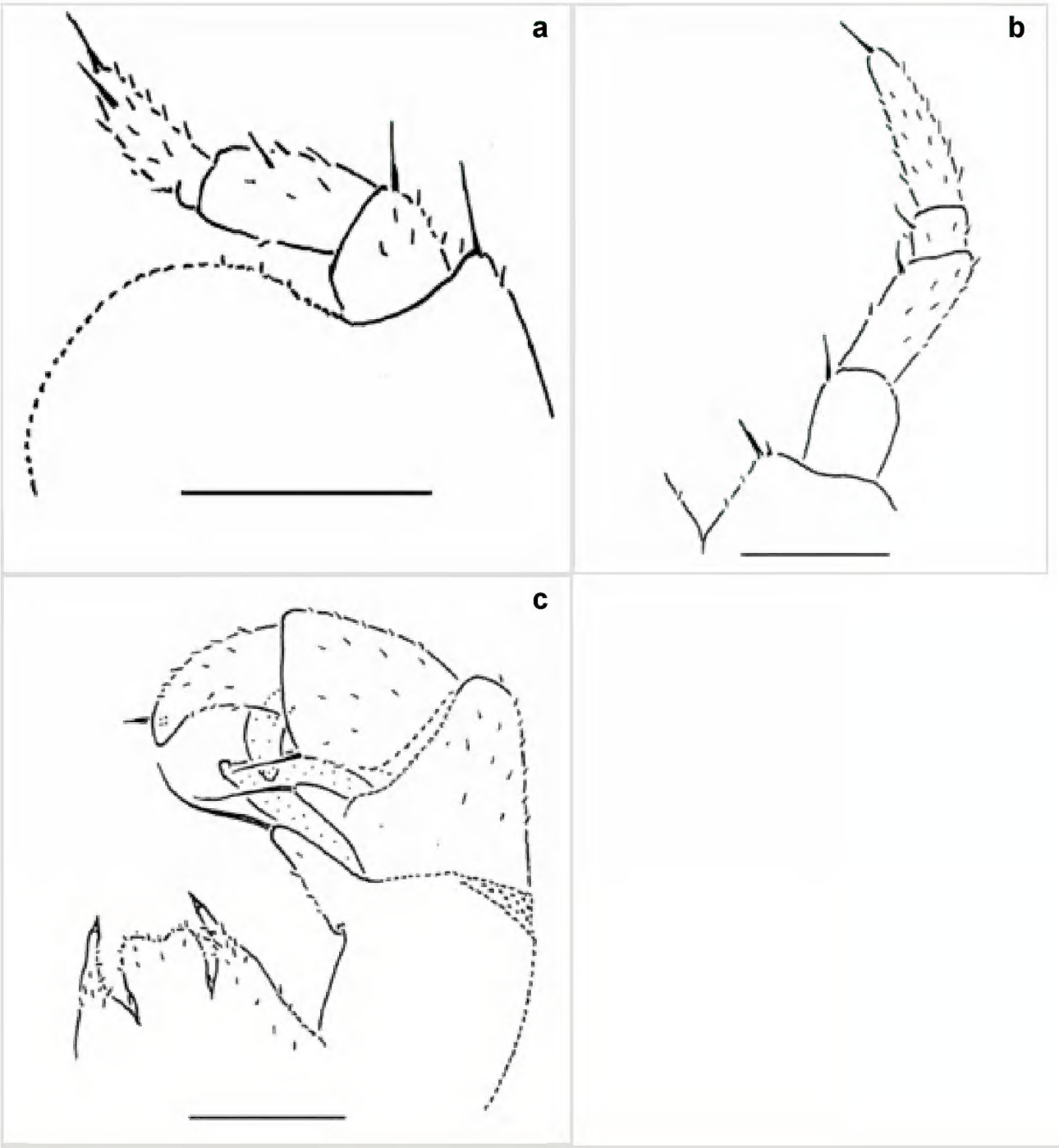

Figure 6.

Hyleoglomeris insularis sp. n., male paratype, legs 17, 18 and 19, respectively, front views.

a: Leg 17. Scale bar: 0.2 mm.
b: Leg 18. Scale bar: 0.2 mm.
c: Leg 19. Scale bar: 0.2 mm.

Diagnosis

Differs from congeners in a partly unpigmented body with only the head retaining some pigment, coupled with a long antennomere 6 which is ca 2.3–2.4 times as long as high, as well as by a rather broad hyposchism produced considerably behind the caudal margin of tergum 2, and only 4-5 transverse striae, of which three cross the dorsum on tergum 2.

Etymology

To emphasize the provenance from an island. An adjective.

Taxon discussion

Due to such a troglomorphic feature as a nearly completely unpigmented body, this species may well prove to be a troglobite. This cave on Kalimnos is known to support at least one more endemic troglobite, the woodlouse *Cordioniscus kalimnosi* Andreev, 1997 (Isopoda, Oniscidea, Styloniscidae) (Schmalfuss 2003).

Acknowledgements

I am greatly obliged to Petar Beron and Pavel Stoev (both NMNHS) for allowing me to study the above interesting material. In addition, Petar Beron most helpfully provided information on some other potential troglobites of Greece. Kirill Makarov (Moscow, Russia) skilfully took all pictures. My visit to the NMNHS in August 2013 was partly supported through the Russian-Bulgarian interacademician exchange programme, partly also by a grant issued by the Ministry of Education and Science of Russia.

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